The following is the abstract from Dr. Mark Fan's and Greg Rose's paper that was published in the 4th Qtr 1997 edition of the International Journal of Microelectronics and Electronic Packaging. By agreement, publishing rights for the complete work remain with the Journal, however, the abstract is shown here to illustrate the contents of that paper. Please feel free to call Dr. Mark Fan for more information on this work or on the topic in general.

Large-Size MCM Attachments:

Dynamic Analyses of Design Alternatives for Spaceflight PWBs

Mark S. Fan
NASA Technology Validation Assurance Program
Goddard Space Flight Center
Greenbelt, Maryland 20771
301-286-0965
301-286-1695

Gregory L. Rose
Electronic Packaging and Processes Branch
Goddard Space Flight Center
Greenbelt, Maryland 20771
301-286-4280
301-286-1695

Abstract

Finite element dynamic analyses have been performed on a printed wiring board (PWB) assembly densely populated with large and heavy multichip modules (MCMs) on both sides. The analyses focus on identifying the cause of fracture failures observed in the Kovar leads during random vibration testing. Based on FEA results, it is concluded that, without epoxy support underneath the MCM packages, some leads are over-stressed and high-cycle fatigue/fracture will occur under a vibration environment typical for launch vehicles lifting satellites into space. The same analyses are also conducted for other cases where different epoxies and attachment patterns are used to attach MCMs to the PWB assemblies. While dynamic stresses are below the Kovar yield strength with these epoxies, the safety margins are too small to ensure system performance and reliability.

These MCMs are simply too large and heavy for their leads. Attaching an MCM of this type to a board through the use of an adhesive is absolutely vital for lead integrity. As a result, adhesive selection and surface preparation assume much greater prominence in the manufacturing cycle. Therefore, if extraordinarily large and heavy MCM packages like these are to be used in the future, an adequate safety margin for the leads must be considered in the final design..

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